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MacDonald's
SKELETON MINING REPORT.

By BERNARD MACDONALD, BUTTE, MONTANA.

This skeleton form of report was framed to assist practical Miners and Mine Owners, who may lack the technical knowledge of the mining engineer, in making a comprehensive report on such mining properties as they desire to present to the consideration of investors, or describe for absent owners.

It will also be found useful and convenient to Mining Engineers as a field notebook, carrying a suggestive outline for their reports, presenting, as it does, in compact form, a skeleton of the information required to form an adequate estimate of a mining proposition, and from which, on their return to their office, they can dictate their finished report in a very short time. Owing to the probable necessity of interpolating other pages in this report, to more fully describe particular features in certain Mining properties, a blank margin line is left on each page for signature of writer.

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.....

Dear Sir:—As a result of my examination of the .....

..... *I am enabled to make the following report which I believe to be correct in every substantial particular. The pages bearing my own signature are filled with information known to me; the pages bearing other signatures are filled by representations made to me by these parties.*

Respectfully yours, ...

REPORT

ON THE

_____ GROUP OF MINES

_____

(Name of town and State.)

BY

_____

(Name and address of writer.)

INDEX.

The.....Group of Mines,

.....

NAMES OF CLAIMS AND AREA OF GROUP.

This property consists of the following named lode claims, viz.:

.....

.....

.....*aggregating an area of about*.....*acres.*

Appurtenant to the group are.....*mill-sites*.....*acres,*

and.....*placer claims*.....*acres,*

making a total area of.....*acres.*

SUGGESTIONS—Page 3.

A plan of the claims of this group should be laid down on the blank plat on page 3, naming the scale or square of such size as will allow of the entire group to be represented on the plat.

Natural objects, as rivers, mountain peaks, creeks, dams, buildings, mills, towns, should also be carefully and correctly marked on the plat.

The name of the group and the scale given to each square should be set down in the blank spaces therefor.

If the claims are patented, their lot number should be given, and if only surveyed, so marked. The north should be indicated by an arrow.

If sufficiently developed, the course of the vein or veins should be dotted over the claims.

MEMORANDA.

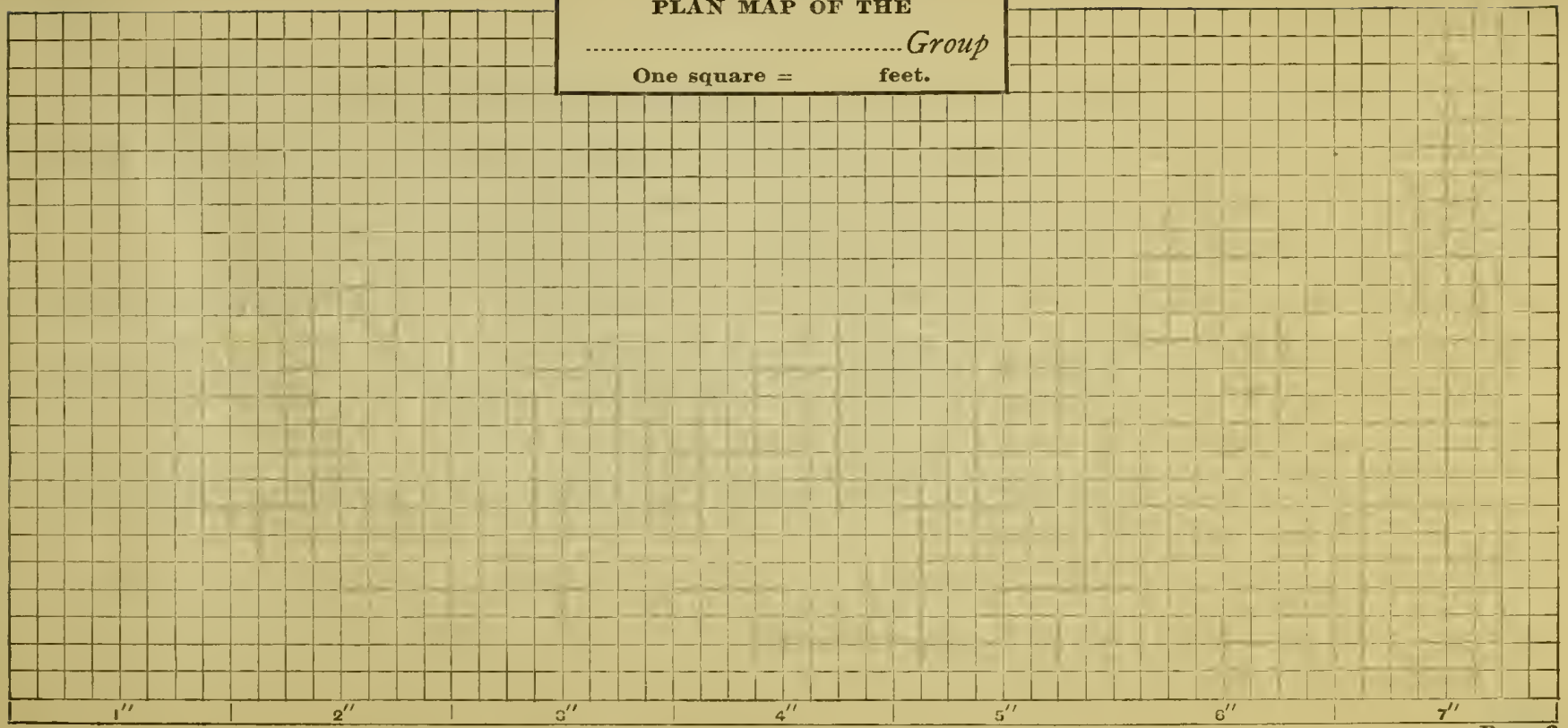
The boundaries of a lode claim properly located should be substantially a parallelogram, and, therefore, its length multiplied by its average width will give its area.

An acre contains 43,560 square feet; a section or square mile contains 640 square acres; one acre is inclosed by 220 x 198 feet; a rod is 16½ feet in length; a mile is 5,280 feet in length. Adjoining claims should be laid down on the plan, page 3, and their general condition described on page 48.

PLAN MAP OF THE

Group

One square = feet.



MEMORANDA.

Good title to the claims does not always convey good title to the veins that may be developed within their lines drawn perpendicularly downwards. Care should be taken to ascertain, if developments will permit, whether the vein developed in the claim outcrops within its side lines and passes through its end lines, as these are necessary requirements to insure extra lateral rights on downward extension of lode veins.

A millsite can not be located on mineral land, and is not patentable if any mineral-bearing veins are known to exist within its boundaries. The same is true of placer claims.

But, if these claims are located and patented according to law in good faith, and mineral veins be afterwards found within their lines, the owner's title to all this mineral is good.

It is important to study the laws of the States and districts relative to the location of mineral lands, as these sometimes materially affect the title.

Where the property is of sufficient importance to warrant the expense, an official abstract of title to the properties should be procured and made part of the report.

TITLES.

Of the lode claims of this group the title to.....to-wit: The

.....

.....

is vested in the owners by ..... while title to the remaining claims is held by location, possession, and compliance with the laws of .....

with.....dispute.

There is.....lien or incumbrance against the property.....

.....

.....

This page is filled on information from.....and the owner guarantees the titles as above set forth.

SUGGESTIONS—Page 7.

It is very important to fill out this page correctly, that the exact location of the property may be found on any good map of the Province in which it is situated. Copies of maps of the district should if possible, be procured to accompany the report. If a map of the surveyed claims of the district can be procured, the group reported on should be shaded, so as to easily arrest the eye. The name of the range of mountains, foothills, or spurs of ranges on which the mines are situated should be given on the bottom line of page 7.

GEOGRAPHY.

This group of claims is situated in.....

.....*Mining District*.....*organized,*

.....*County,* ....., *and*

.....*distant in a*.....*direction*.....

miles from.....*the nearest railroad station. The*

county seat (.....) *is distant*.....*miles in a*

.....*direction, and is reached by*.....

.....*over*.....

.....

SUGGESTIONS FOR FILLING PAGE 9.

The names of the first discoveries of the district, the first claims located, the principal events and mining operations that have occurred in the district till the present writing, will be interesting and valuable, and should be given under this heading.

Such information can generally be had, with sufficient accuracy for the purpose of this report, from the pioneers, or "oldest inhabitants," of the district.

When desirable, all recorded transactions can be obtained from the county records.

The first mining failures in a district generally give it a "black eye," but should not condemn it, and if frankly admitted and explained would probably lead to an early investigation, and probably a solution of the causes.

Mining propositions that have hitherto baffled successful solution may become profitable ventures under the supervision of up-to-date mining engineers and metallurgists, and a business management.

HISTORICAL.

The.....Mining District was first discovered in 18.....by.....

SUGGESTIONS FOR PAGE 11.

It frequently happens in the early stages of mining camps that they are reached over trail, or partly by trail and wagon road, from the nearest railroad station. In such cases the lengths of each should be given, together with estimate of the cost of building new wagon roads, trails, or the improvement of existing ones.

The altitude of camps may be obtained from visiting civil or mining engineers, who generally carry aneroids among their outfits. The depth of snow fall, and length of suspended traffic on this account, should be noted.

MEMORANDA.

Where ground consists of earth and loose rock a sidehill wagon road with 9-foot roadbed, 7 feet of which is solid and 2 feet made ground, and having to cut from 4 to 6 feet on upper side, can be built in the rocky mountain regions for from $1.50 to $2.00 per rod, using sidehill plows, scrapers, and picks and shovels. In slide rock, if the roadbed is not to be covered with earth or gravel, it can be built for $1.00 per rod, but such road is not fit for wagon traffic until covered with earth or gravel, the cost of which will depend on local circumstances.

ACCESSIBILITY.

From.....Station on the.....

.....Railroad, this property is reached over.....

miles of.....wagon road and.....

.....miles in length—a total length of.....miles from the railroad. The elevation of the mine....is.....feet higher than the railroad station, and.....feet above sea level.

.....

.....

.....

.....

SUGGESTIONS—Page 13.

The more extensively developed vein of the group should be described on this page by filling out the blank spaces with the information called for. If others than one vein of the group are developed, and show marked difference in characteristics, pages similar to 13 should be interpolated immediately following it.

Pages 14 and 15 are left blank to be filled with such peculiar characteristics as may appear worthy of notice — whether the vein is wet or dry, carries waste rock or horses, cuts off, faults, flattens, straightens, and the effect such features have on the grade of the ore.

GENERAL CHARACTERISTICS OF VEIN....

The.....vein....ha.....the following characteristics:

Strike.....

Dip..... .....degrees to the

Width, varying from.....feet;

Outcrop.....traceable for a distance of.....feet;

Hanging wall.....

Foot wall.....

Vein filling consists of.....

Oxidized ore extends down about.....feet.

GENERAL CHARACTERISTICS OF VEIN.... — Continued.

GENERAL CHARACTERISTICS OF VEIN.... — Continued.

The names of the rocks inclosing the vein on foot and hanging wall sides are to be given here, and the class and character of the dikes, if any, occurring in the neighborhood of the veins should also be filled in. The character of the country rock surrounding the immediate vicinity of the mines should also be given, and the names of the creeks draining the hills or mountains on which the mines occur, and the river into which they empty.

NOTE.

Mine owners should make a thorough study of the formation inclosing the veins, and the dike system (if there be one) occurring in their neighborhood. For the time necessary to spend for this work, nothing pays better. A thorough understanding of the geology of the country inclosing the veins frequently gives its possessor the key to the location of the bonanza ore bodies of the group.

The country rock on the hanging wall of the.....vein....is.....

.....; on the foot wall side

it is.....; dikes of

.....occur.....

.....

The country surrounding the immediate vicinity of the mines is composed of.....

.....

.....and is drained by

.....creeks, tributaries of the.....river.

The number and dimensions of the shafts, drifts, raises, winzes, and open cuts by which the veins of each claim are developed should be given under this heading, and as many duplicate pages as may be necessary to fully enumerate all the developments on the group should be interpolated after this page.

NOTE.

It is very important that all development work should be accurately measured and located with reference to the boundaries of the claim and position of the vein, and this should appear on the maps forwarded with report. It should be definitely ascertained how many feet of the total developments has been made on, along, or in the veins, and the amounts stated in the report.

If any of the developments called for on page 19 do not exist that portion not existing may be scratched out.

DEVELOPMENTS.

On the.....Claim there are a total of.....lineal feet of developments, consisting of.....feet of shaft; size.....

.....“ tunnels; “.....

.....“ winze; “.....

.....“ raises; “.....

.....“ open cut; “.....

.....“ drift; “.....

.....“ cross cut; “.....

Making a total of.....feet. Value about $.....

TABLE*

Showing the number of feet (board measure) contained in a piece of joist, scantling, or timber, of the sizes given below.

LENGTH IN FEET SHOWN IN TOP LINE OF TABLE.

(MacDonald's Skeleton Mining Report.)

SIZE IN INCHES.	12	14	16	18	20	22	24	26	28	30	42	44	45
2 x 4	8	9	11	12	13	15	16	17	19	20	28	29	30
2 x 6	12	14	16	18	20	22	24	26	28	30	42	44	45
2 x 8	16	19	21	24	27	29	32	35	37	40	53	58	60
2 x 10	20	23	27	30	33	37	40	43	47	50	70	74	75
2 x 12	24	28	32	36	40	44	48	52	56	60	84	88	90
3 x 4	12	14	16	18	20	22	24	26	28	30	42	44	45
3 x 6	18	21	24	27	30	33	36	39	42	45	63	66	68
3 x 8	24	28	32	36	40	44	48	52	56	60	84	88	90
3 x 10	30	35	40	45	50	55	60	65	70	75	105	110	113
3 x 12	36	42	48	54	60	66	72	78	84	90	126	132	135
4 x 4	16	19	21	24	27	29	32	35	37	40	56	58	60
4 x 6	24	28	32	36	40	44	48	52	56	60	84	88	90
4 x 8	32	37	43	48	53	59	64	69	75	80	112	118	120
4 x 10	40	47	53	60	67	73	80	87	93	100	140	146	150

SIZE IN INCHES.	12	14	16	18	20	22	24	26	28	30	42	44	45
4 x 12	48	56	64	72	80	88	96	104	112	120	168	176	180
6 x 6	36	42	48	54	60	66	72	78	84	90	126	132	135
6 x 8	48	56	64	72	80	88	96	104	112	120	168	176	180
6 x 10	60	70	80	90	100	110	120	130	140	150	210	220	225
6 x 12	72	84	96	108	120	132	144	156	168	180	250	265	270
8 x 8	64	75	85	96	107	117	128	139	149	160	224	234	240
8 x 10	80	93	107	120	133	147	160	173	187	200	280	294	300
8 x 12	96	112	128	144	160	176	192	208	224	240	336	352	360
10 x 10	100	117	133	150	167	183	200	217	233	250	350	366	375
10 x 12	120	140	160	180	200	220	240	260	280	300	420	440	450
12 x 12	144	168	192	216	240	264	288	312	336	360	504	528	540
12 x 14	168	196	224	252	280	308	336	364	392	420	588	616	630
14 x 14	196	229	261	294	327	359	392	425	457	490	686	716	735
16 x 16	256	298	341	384	426	469	512	554	587	640	896	939	960

* Fractions of feet are omitted.

MINING FACILITIES.

FUEL—For this there is a.....supply of.....

timber. Cordwood costs $.....per cord, delivered at the mine. Coal costs $.....

per ton delivered at..... Charcoal costs $.....per bushel at the mine.

MINING TIMBER AND LUMBER—Timber for stull and tunnel sets ranging from

.....to.....inches in diameter can be delivered at the mine at a cost of from.....c.

to..... .....c. per running foot. Lagging poles cost.....c. per 15-feet lengths. Lumber

at a cost of $.....per thousand at.....

.....

.....

The character, quality, and quantity of water available for steam and domestic purposes, together with the distance from the mine, should be given.

If there be any water available for power purposes within five miles of the mine, its flow in cubic feet, and fall obtainable at a good mill site, length of ditch necessary, and cost of constructing same per rod should be given.

NOTES.

As an accurate test of water flowing in any large mountain stream involves considerable time and expense, the following rules for calculating the amount of water flowing in an open stream will be sufficiently accurate for the purposes of this report.

The height of head can be approximately found by the use of the aneroid.

Freezes 32° Fahr.; boils 212° Fahr.; max. density 39.1° Fahr. is the standard for specific gravity; 1 cubic centimeter=1 gram; 1 U. S. gallon=231 cubic inches, or 8.3311 lbs., or 8.34 lbs. for ordinary practice; 1 cubic foot=62.41 lbs. @ freezing; 62.355 @ 60°, which is standard temperature; 1 cubic foot=7.485 U. S. gallons; 1 column 1 inch square=1 lb. if 2.35′ high; 1 column 1 inch square 1 foot high=.433 lbs.

Amount of water required for a gold stamp mill will vary from 5 tons to 15 tons (according to the character of the ore, kind of mortars and concentration used) per ton of ore crushed. This does not include that required for boiler, which is about 7½ gallons per horse power per hour.

A miners' inch=about 1½ cubic feet=about 11.22 gallons.

MEASUREMENT IN AN OPEN STREAM BY VELOCITY AND CROSS SECTION.

Measure the depth of the water at from six to twelve points across the stream at equal distances between. Add all the depths in feet together and divide by the number of measurements made. This will be the average depth of the stream, which, multiplied by its width, will give its area or cross section. Multiply this by the velocity of the stream in feet per minute and you will have the cubic feet per minute of the stream.

The velocity of the stream can be found by laying off 100 feet on the bank and throwing a float into it at the middle, noting the time passing over the 100 feet. Do this a number of times and take the average. Then dividing this distance by the time gives the velocity in feet per minute at the surface. As the top of the stream flows faster than the bottom or sides — the difference being about eight feet per cent. — it is better to measure a distance of 120 feet for float and reckon it as 100.

The flow of water in any stream should be measured in low water season.

A water ditch 3 feet deep and 4 feet wide can be dug by laborers with pick and shovel at a cost of about $1.50 per rod in earth and loose rock, wages $2.50 per day. With plows or ditching machines the cost would be less.

FOR DOMESTIC PURPOSES, there is.....

.....*water within*.....*feet of the mine*....

FOR STEAM PURPOSES, there is.....

.....*water within*.....*feet of the mine*....

FOR POWER PURPOSES, there is a flow of.....*cubic feet, for which a fall of*.....*feet can be had at a suitable site for a plant by taking it through a ditch*.....*feet in length. Such a ditch could be built for $*.....*per rod.*

.....

.....

The nearest large distributing supply town, and the railroad and wagon freight from it to the mining camp, are to be filled in this page. Also, whether farm produce is raised in abundance or otherwise in the neighborhood of the mine, and the cost of the various articles of food for man and animals mentioned.

NOTE.

The information called for on page 27 is sometimes an important factor in the operation of a mining company, and should therefore be given with some care, and with as much accuracy as possible.

SUPPLIES—Hardware, etc., can be had at.....prices, with freight of.....c. per pound added.

Farm produce.....

.....flour costs from.....c. to.....c. per lb. *Creamery butter costs.....c. per lb.*

Potatoes cost from - - .....c. to.....c. per lb. *Canned fruit costs $.....per case.*

Beef costs from - - - .....c. to.....c. per lb. *Oats cost - - - - .....per 100 lbs.*

Ranch butter costs from.....c. to.....c. per lb. *Hay costs - - - - .....per ton.*

General groceries cost a trifle over.....prices.

.....

SUGGESTIONS—Page 29.

The daily wages for the different classes of labor and the contract prices of the different classes of mining work, mentioned on this page, are to be given.

NOTE.

The cost of labor is one of the largest factors entering into the calculations of profit or loss of a mining enterprise, and should be set down fully and correctly.

In surface developments the rock is generally softer than when greater depths are obtained, and adequate allowance should be made therefor in estimating cost of deeper developments.

Miners' daily wages, - - - - $..... *Carpenters' daily wages, - - $.....*

Carmen's daily wages, - - - ..... *Blacksmiths' daily wages, - - .....*

Teamsters' monthly wages, - ..... *Common top labor, daily wages, ...*

Four-horse teams with teamster, daily wages, - - $.....

CONTRACT WORK:

Cross-cut tunnels, $4\frac{1}{2} \times 6\frac{1}{2}$ feet in the clear, can be run by contract for - $.....per foot.

Drifts on veins, $4\frac{1}{2} \times 6\frac{1}{2}$ feet in the clear, can be run by contract for - - ..... "

Raises on vein, $4\frac{1}{2} \times 6\frac{1}{2}$ feet in the clear, can be run by contract for - - ..... "

Incline shaft on vein, 5 x 7 feet in the clear, can be sunk for - - - - ..... "

In calculating the tonnage and value of ore "in sight" in a mine, the most conservative practice demands that three sides of the ore body be exposed by the developments, but this in all cases is not necessary.

If the vein is regular, an ore chute cut by several levels may be considered sufficiently developed to admit of close calculation as to its tonnage and value of the ore above lowest level. Two sides of an ore body may be considered sufficient for this calculation, allowing a one-third discount when the developments of a mine are limited and the ore chutes are not known to be regular. It should be stated plainly by what developments and their dimensions the ore is placed in sight.

NOTES.

The average length, breadth, and thickness of an ore body in feet, multiplied by each other, will give its cubic contents in feet. These divided by 10 to 12 if the ore be sulphide, and from 13 to 18 if the ore be oxidized, with 7% to 10% off for moisture, will give the tonnage approximately.

22 to 24 cubic feet of oxidized ore in dumps make one ton; about 15 to 18 of sulphide. See page 32 for weights of various rocks in place and broken.

ORE TONNAGE IN SIGHT AND VALUE THEREOF.

In the.....Claim there are about.....tons of ore in sight, having an average value of about $.....per ton. The ore is exposed by the.....

.....

.....

.....

.....

.....

.....(*See page 33.*)

WEIGHTS OF ROCK.

NAMES OF ROCK.	AVERAGE WEIGHT OF CUBIC FOOT.	
Granite and porphyry	170 pounds in place	97 pounds broken.
Gneiss	168 "	96 "
Greenstone and trap	187 "	107 "
Limestone	168 "	96 "
Slate	175 "	95 "
Quartz	165 "	94 "
Sandstone	151 "	86 "

WEIGHT OF PINE, LUMBER.

Pine, 1,000 feet board measure, perfectly dry, weighs 1,860 pounds. Green timbers usually weigh from one-fifth to nearly one-half more than dry; and ordinary building timbers, when tolerably seasoned, about one-sixth more than perfectly dry.

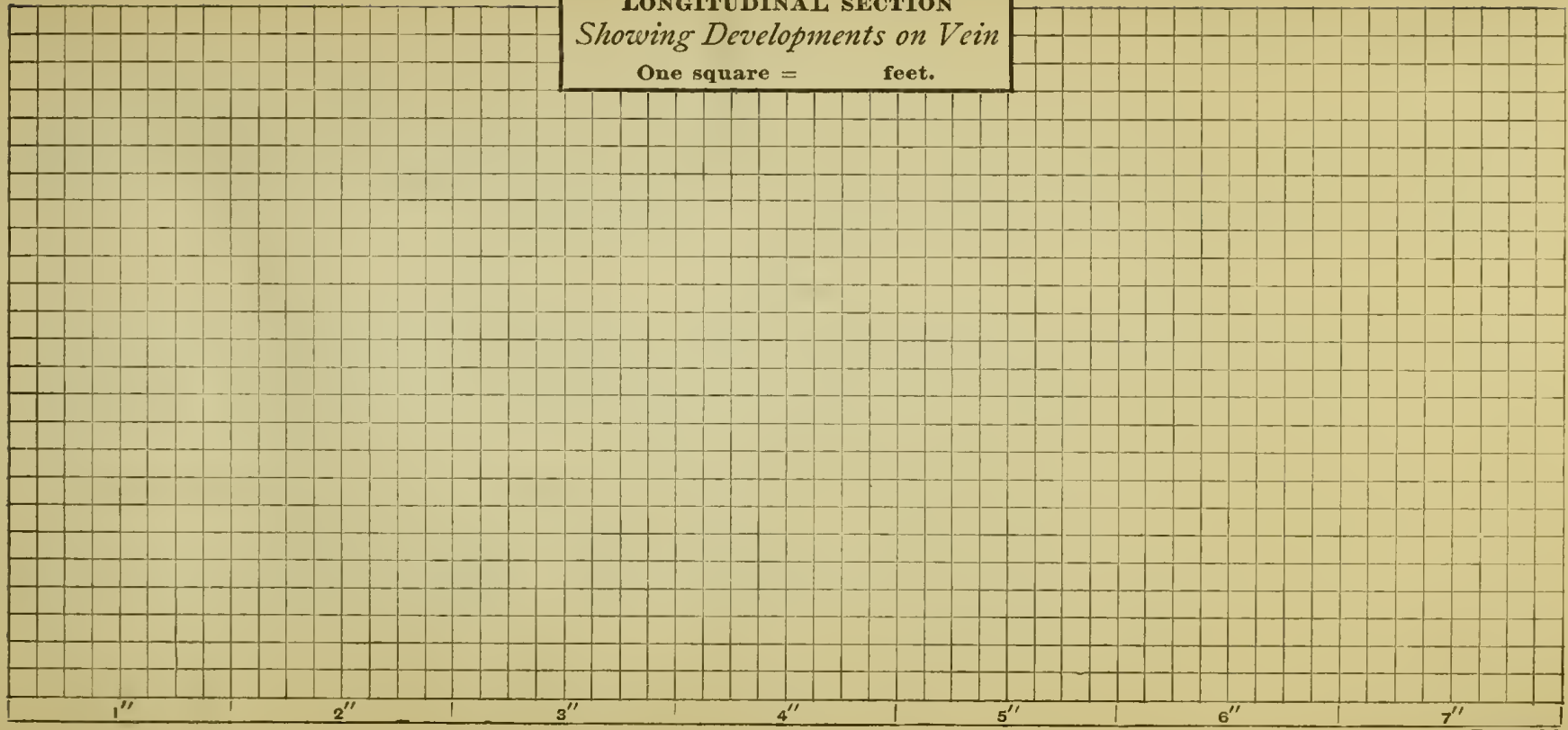
WEIGHT OF EARTH.

18 cubic feet of earth in bank=1 ton; 27 cubic feet of earth dry and loose=1 ton; 17 cubic feet of clay=1 ton; 25 cubic feet of sand=1 ton.

LONGITUDINAL SECTION

Showing Developments on Vein

One square = feet.



The description of samples assayed should clearly express the character of the ore, the width of the streak or vein, and the locality from which it was taken. The name of the party by whom the samples were taken, and that of the assayer, are to be given.

NOTE.

While, in order to learn the characteristics and the grade of the various classes of ore in a mine, it is necessary to take a number of specimen or characteristic samples, yet such samples do not furnish the proper data on which to estimate the average value of the ore.

Cold average samples of the various streaks in the vein, if it is wide and carries different grades of ore, should be taken, and these should be checked by average samples of the entire vein.

Samples of the country rock adjoining the vein should be taken. Frequently considerable portions of the country rock are profitably mineralized.

ASSAYS.

Samples taken by..... *and*

assayed by..... *ran as follows:*

Nos.	DESCRIPTION.	GOLD. VALUE PER TON		SILVER. OZ. PER TON.
		$		
1				
2				
3				
4				
5				
6				
7				

ASSAYS—Continued.

Nos.	DESCRIPTION.	GOLD. Value Per Ton.		SILVER. Oz. Per Ton.
		$		
a				
b				
c				
d				
e				
f				
g				
h				
i				
j				
k				

ASSAYS—Continued.

Nos.	DESCRIPTION.	GOLD. VALUE PER TON.	SILVER. OZ. PER TON.
8		$	
9			
10			
11			
12			
13			
14			

Gold calculated at $20.00 per oz.

Silver calculated at.....per oz. *General average, $.....per ton.*

SUGGESTIONS *re* LONGITUDINAL SECTION AND SHIPMENTS.

A longitudinal section of the vein, showing the developments thereon and the area of the stoped-out portions, should be drawn accurately on page 39. These blank section pages may be used for a plan map of the mine and mill buildings, or any other feature that may be necessary to illustrate the description of any section of the report.

The tonnage shipped or treated, plus the low-grade ore, if any, remaining on the dump, will be the total yield of so much of the vein as is stoped out. This will furnish a key, or a check at least, on the amount of ore in the vein.

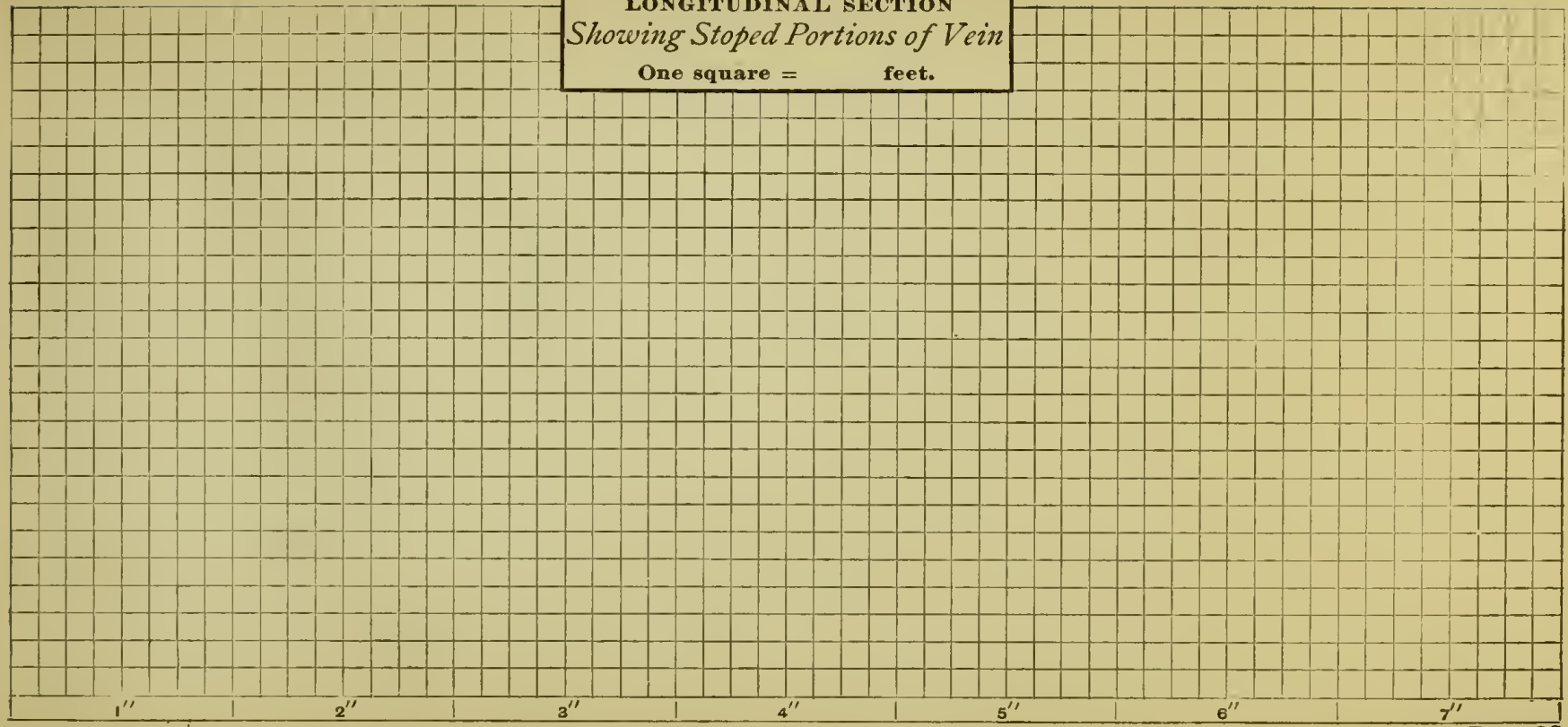
SHIPMENTS.

Page 41 should be filled from smelter statements, and the cost of mining and transporting conservatively estimated.

LONGITUDINAL SECTION

Showing Stoped Portions of Vein

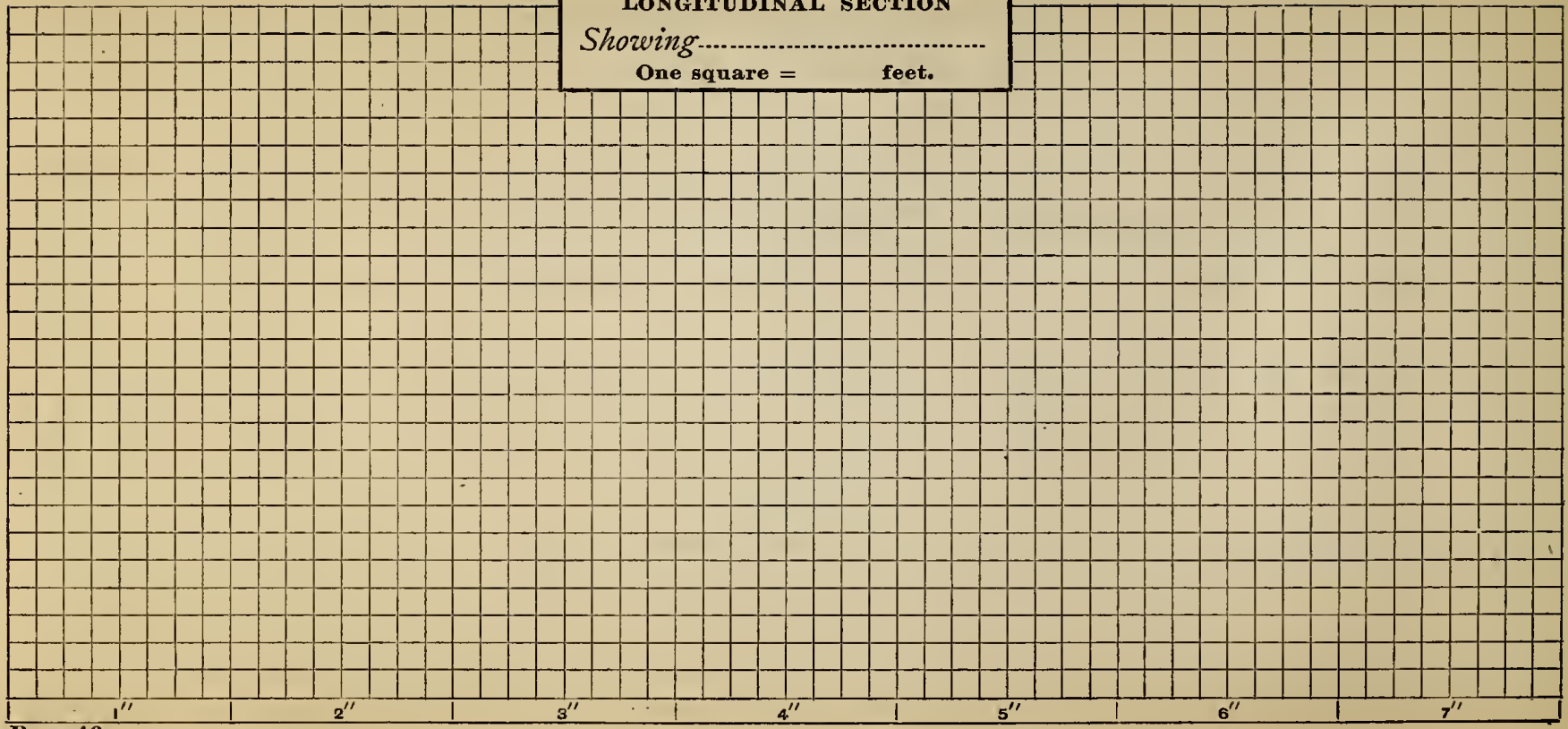
One square = feet.



LONGITUDINAL SECTION

Showing.....

One square = feet.



SHIPMENTS AND PROCEEDS.

There have been.....tons of first-class ore shipped to the.....

.....which netted $.....per ton.

Also.....tons of second-class ore to the.....

which netted $.....per ton. Average net returns. $.....per ton.

Estimated cost of mining this ore, - $.....per ton.....

Cost of wagon transportation, - - - .....per ton.....

Cost of railroad transportation, - - .....per ton.....

Total expense, - - - - - - - - - - - - - - - - - $.....per ton.

Profit per ton, $.....

NOTE.

When the ores below water level are sufficiently developed they should be sampled by a series of practical milling tests in various reduction works to ascertain the methods best adapted for their reduction. When the proper method and capacity of plant has been decided upon, proposals for the erection of such a plant should be asked of the various manufacturers. Their offers, the character and capacity of the plant should be inserted in page 43. If the mine is not sufficiently developed for such an estimate, the writer can make forecast of the probable best method of reduction.

REDUCTION PLANT.

The ores of this property are suitable for reduction by the.....

.....*process*.....

A reduction plant of this character, of.....*tons daily capacity, will cost, erected and ready to run, $*..... *Estimate by*.....

.....

.....

.....

.....

.....

With the understanding that the reduction plant described on page 43 is erected and in operation, the blank estimates on this page are to be filled out.

NOTE.

Liberal estimates should be made of all items of expense, as these for the first year or two generally run higher than in plants longer established.

A completed plant generally costs about one-third more than even conservative estimates. The reasons for this are various and may be set down as "unforseen causes," developing as the work of erection progresses.

ESTIMATE OF PROFIT WITH PLANT RECOMMENDED ON PAGE 43.

.....tons per day of assay value of $.....per ton, - - $.....

Loss in treatment,.....per cent, - - - - - - - - - $.....

Cost of mining.....tons, at $.....per ton, - .....

Cost of transportation,.....tons, at $.....per ton,.....

Cost of reduction,.....tons, at $.....per ton, ...

All other items of expense, say, $.....per ton, - - .....

Total cost, - - - - - - - - - - - - - - - $.....$.....

Net profit per day, - $.....

Net profit per month, of 28 days, $.....

SUGGESTIONS—Page 47.

The spaces left blank on this page will suggest the manner of filling it out. But inasmuch as it would be impossible to frame a blank that would be suitable to all conditions under which the owners might be willing to part with their property, it is suggested that conditions acceptable to them be written on a separate sheet of suitable size, and interpolated here by mucilaging it on to this page.

NOTE.

Parties owning or controlling unproductive mining property should be prepared to bond it on reasonable terms or give interests in it to parties who will undertake its systematic development. This nearly always insures its ultimate purchase.

SUGGESTIONS—Pages 48-49-50.

A general description of the character of adjoining properties stating amount of developments, grade, and extent of ore bodies, in short, a brief, general report on them is of material advantage to the presentation of the economic features of the property under consideration. Pages 48-49-50 are blank for this purpose.

PRICE AND TERMS OF SALE.

The parties.....will sell for $.....

payable in.....installments of $.....each. First,.....

.....; second,.....months thereafter.....

.....

.....

or, they will lease and bond it for.....years.....under the

following conditions:.....

.....

.....

GENERAL DESCRIPTION OF ADJOINING PROPERTIES.

GENERAL DESCRIPTION OF ADJOINING PROPERTIES—Continued.

GENERAL DESCRIPTION OF ADJOINING PROPERTIES — Continued.

TRAVELING AND OTHER EXPENSES NECESSARY IN MAKING EXAMINATION.

189....

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Under this heading should be given a list and description of the maps, assay certificates, reports, and letters, with names of writers; newspaper clippings and photographs of the mine in question, which are sent with report.

These go to make up the evidence necessary for a full investigation of the merits of the proposition.

ENCLOSURES.

Herewith please find enclosed:

Maps.....

Assays.....

Report....by .....

Letter....by.....

Newspaper clippings from.....

Photographs.....

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CALENDAR FOR 1897.

JANUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

FEBRUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	..	..	..	..	..	..
..	..	..	..	..	..	..

MARCH

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	..	..	..
..	..	..	..	..	..	..

APRIL

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..	..	..	..	..	..	..

MAY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

JUNE

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	..	..	..
..	..	..	..	..	..	..

JULY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
..	..	..	..	..	..	..

AUGUST

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	..	..	..	..
..	..	..	..	..	..	..

SEPTEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	..	..
..	..	..	..	..	..	..

OCTOBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	..	..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	..	..	..	..

NOVEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	..	..	..	..
..	..	..	..	..	..	..

DECEMBER

Sun	Mon	Tue	Wed	Thu	Fri	Sat
..	..	..	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..	..	..	..	..	..	..

MEMORANDA:

DIRECTIONS AND TIME NECESSARY TO REACH THE PROPERTY.

189.....

DATE.	TIME.	DIRECTION.
.....	.....*M.*	*Leave*.....*via*.....
.....	.....*M.*	*Arrive*.....
.....	.....*M.*	*Leave*.....*via*.....
.....	.....*M.*	*Arrive*.....
.....	.....*M.*	*From this, the nearest railroad station, the distance to the mines*

(..... .....*miles) is made by*.....

.....

Total time required for this trip.....

SUGGESTIVE HINTS—Pages 57, 58, 59.

The writer of the report is expected to fill out these pages with his own words and ideas, making such recommendations as his examination will suggest to be the proper mode of procedure in dealing with the property.

The owners should be willing to give a working bond with deed in escrow to parties who would undertake a certain stipulated amount of work upon it, this work being such as would be calculated to prove the ore body in depth, or extend developments in some direction most likely to demonstrate the merits of the property.

It is unreasonable for owners of undeveloped mines to ask for cash payment for granting a working bond, if the party bonding agree to prosecute a reasonable amount of development.

RECOMMENDATIONS.

RECOMMENDATIONS—Continued.

RECOMMENDATIONS—Continued.

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Respectfully submitted,

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MINING DEED.

THIS INDENTURE, made the ——— day of ———, in the year of our Lord one thousand eight hundred and eighty ———, between ———————, of the county of ———, and ——— of ———, party of the first, and ———————, of the county of ———, and ——— of ———, party of the second part;

Witnesseth, That the said party of the first part, for and in consideration of the sum of ——— dollars, lawful money of the Dominion of Canada to him in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents does grant, bargain, sell, remise, release, and forever quit-claim, unto the said party of the second part, his heirs and assigns, the ——— lode, as located, surveyed, recorded, and held by said party of the first part, situated in ——— mining district, ——— county, ———, together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver bearing quartz, rock and earth therein, and all the rights, privileges, and franchises thereto incident, appendant, and appurtenant, or therewith usually had and enjoyed; and also, all and singular the tenements, hereditaments, and appurtenances thereunto belonging, or in any wise appertaining, and the rents, issues, and profits thereof; and also, all the estate, right, title, interest, property, possession, claim and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold, all and singular, the said premises, together with the appurtenances and privileges thereto incident, unto the said party of the second part, his heirs and assigns forever. In witness whereof, the said party of the first part has hereunto set his hand and seal the day and year first above written.

[SEAL.] ———————

MINING LEASE.*

THIS INDENTURE, made this ——— day of ———, in the year of our Lord one thousand eight hundred and eighty ———, between ——— lessor and ——— lessee or tenant; *Witnesseth*, That the said lessor, for and in consideration of the rents, royalties, covenants, and agreements hereinafter reserved, and by the said lessee to be paid, kept, and performed, ——— granted, demised, and let, and by these presents to grant, demise, and let unto the said lessee, all the following described mine and mining property, situated in ——— mining district, county of ———, ——— of ———, to wit: (Here description of property.) Together with the appurtenances ———, to have and to hold unto the said lessee or tenant for the term of ——— from the date hereof, expiring at noon on the ——— day of ———, A. D. 188—, unless sooner forfeited or determined through the violation of any covenant hereinafter against the said tenant ——— reserved.

And in consideration of the said demise the said lessee does covenant and agree with said lessor as follows, to wit:

To enter upon said mine or premises and work the same mine fashion, in manner necessary to good and economical mining, so as to take out the greatest amount of ore possible, with due regard to the safety, development, and preservation of the said premises as a workable mine.

(Here insert special covenants for dead work, etc.)

*From Morrison's Mining Rights in Colorado.

NOTE.—The covenants of a mining lease are peculiar, and can not be too particularly stated in the instrument. If for more than one year it should be in writing and recorded.

Instead of a lease a license may be granted. The distinctions between a lease and a license are technical but important.

A license, usually, is not exclusive, and invests no property in the mineral until severed. Work done for lessees can not subject the ground to a miner's lien.

ESCROW AGREEMENT.

The inclosed deed of the ——— lode is hereby placed in the ——— Bank of ———, *in escrow*. If A. B. shall place, or cause to be placed, to the credit of C. D. and E. F., in said ——— Bank of ———, on or before ———, 188—, the full sum of ——— dollars, then and in that case the said bank is hereby authorized to deliver the inclosed deed to A. B. or his order. In case the said A. B. shall not place, or cause to be placed, to the credit of said C. D. and E. F., in said bank, the full sum of ——— dollars, on or before ———, 188—, then the said bank is hereby authorized to deliver the inclosed deed to the said C. D. and E. F., or their joint order.

(Signed) C. D.

E. F.

A. B.

———————, 188—, (Place and date).

NOTE.—When the option for the purchase of a mine is desired by a third party, it is the safest and best plan for the mine owner to put a deed *in escrow*. It saves encumbering of the record, and any questions that might arise concerning the payment of money. The deed should be a warranty, quit-claim, or mining deed, as agreed, fully executed and acknowledged, ready for delivery, put in a sealed envelope, and placed in some bank, or left with some responsible person, with an agreement written upon the envelope as above.

DATA FOR FLUMES AND DITCHES.

To give a general idea as to the capacity of flumes and ditches for carrying water, the following data is submitted:

The greatest safe velocity for a wooden flume is about 7 or 8 feet per second. For an earth ditch this should not exceed about 2 feet per second. In California it is the general practice to lay a flume on a grade of about ¼ inch to the rod, or often 2 inches to the 100 feet, depending on the existing conditions.

Assuming a rectangular flume 3 feet wide, running 18 inches deep, its velocity and capacity would be as shown below:

GRADE.	VEL. IN FT. PER SEC.	QUANTITY CU. FT. MIN.
⅛ inch to rod.	2.6	702
¼ " " "	3.7	999
½ " " "	5.3	1,431

As the velocity of a flume or ditch is dependent largely on its size and character of formation, no more specific data than the above can be given.

It is not safe to run either ditch or flume more than about three-fourths or seven-eighths full.

In a paper read before the Association of Engineers, of Wurtemberg, Germany, some interesting figures are given in regard to the cost of the equipment and operation of a plant of 217 horse power, installed by the Esslinger-Cannstatt Works. The transmission in this case covered a distance of 5½ kilometers—equal to 3.4 miles—both by compressed air and by electricity. The cost of the compressed air equipment, including dam for the waterfall wheels, compressor, air motors, etc., is given as $37,500; the efficiency, 46 per cent.

The cost of the electric equipment, including dam, water power, etc., as in the previous case, $27,500; efficiency, 69 per cent, including a loss of 15 per cent in the wiring. The cost of operation was practically the same in both cases, though only 100 horse power was actually available with the compressed air, while 150 horse power was delivered by the electric system, thus making the cost per horse power delivered in the former case $37.50, and in the latter, $18.85.

The charges for depreciation were somewhat less for electricity than for compressed air, which still further favored the economy of the former.

NOTE.—The percentage of efficiency shown in either of the above examples is much below what is guaranteed by American manufacturers under similar conditions, though the relative advantages of the systems may be the same.

COMMON MEASURES AND WEIGHTS, WITH THEIR METRIC EQUIVALENTS.

The following are some of the measures in common use, with their equivalents in measures of the metric system:

Common Measures.	Equivalents.	Common Measures.	Equivalents.	Common Measures.	Equivalents.
An inch	2.54 centimeters.	An acre	.4047 hectare.	A peck	8.811 liters.
A foot	.3048 meter.	A square mile	259 hectares.	A bushel	35.24 liters.
A yard	.9144 meter.	A cubic inch	16.39 cu. centimeters	An ounce avoird.	28.35 grams.
A rod	5.029 meters.	A cubic foot	.02832 cu. meter.	A pound avoird.	.4536 kilogram.
A mile	1.6093 kilometers.	A cubic yard	.7646 cu. meter.	A ton	.9072 tonneau.
A square inch	6.452 sq. centimeters	A cord	3.624 steres.	A grain Troy	.0648 gram.
A square foot	.0929 sq. meter.	A liquid quart	.9465 liter.	An ounce Troy	31.104 grams.
A square yard	.8361 sq. meter.	A gallon	3.786 liters.	A pound Troy	.3732 kilogram.
A square rod	25.29 sq. meters.	A dry quart	1.101 liters.		

The money system of France is connected with that of metric weights by an authorized coin of silver (the standard being 9 parts silver and 1 of alloy) representing the unit, called the Franc, and weighing 5 grams. The other coins are multiples and sub-multiples of the franc. The ratio of value of gold and silver is fixed by law at 15½ to 1. The 20-franc gold piece, therefore, weighs 5 grams, divided by 15½=6.4516 grams of standard gold.

SPECIFICATIONS OF STANDARD BOILERS.

Number of Size	1	2	3	3½	4	5	6	7	7½	8	9	10	10½	11	12	13	14	15	16	17
Horse Power, usually rated	10	12	15	20	20	25	30	35	40	40	45	50	60	60	70	80	90	100	125	150
Diameter of Boiler - in ins.	30	30	36	36	42	42	44	44	44	48	48	54	54	60	60	60	66	66	72	72
Length Tubes used - feet	7	8	8	10	8	10	10	12	14	12	14	12	15	12	14	16	15	16	16	18
No. of Tubes, 3-in. - -	20	20	28	28	38	38	46	46	46	52	52	64	64	82	82	82	98	98	120	84
Sq. ft. heat'g surface, about	151	185	220	288	305	376	440	526	611	591	687	708	880	885	1028	1172	1296	1377	1660	4" Tbs
Length Grates - - in ins.	36	36	36	42	36	42	42	48	54	48	54	48	54	48	54	54	54	54	54	60
Diameter of Dome - "	18	18	20	20	22	22	22	22	22	26	26	30	30	32	32	32	36	36	36	36
Height of Dome - - "	20	20	22	22	24	24	24	24	24	28	28	34	34	36	36	36	40	40	40	40
Thickness of Shell - "	¼	¼	¼	¼	9/32	9/32	9/32	9/32	9/32	5/16	5/16	5/16	5/16	11/32	11/32	11/32	3/8	3/8	7/16	7/16
" Main Heads "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½
Diam. Smoke Stack - "	14	14	16	16	20	20	22	22	22	24	24	26	26	28	28	28	30	30	34	36
Length " " - in ft.	28	28	28	35	28	35	35	40	50	40	50	40	50	40	50	60	60	60	60	60
Weight of Boiler - about	1900	2300	2600	2900	3500	4000	4300	4900	5500	6000	6800	7000	8200	9000	9900	11000	12700	13000	16000	17300
Weight with Fixtures, about	3400	3900	4300	4850	5700	6500	6900	7600	8500	9400	10300	10600	12000	13000	14400	16000	17700	18000	22000	23500
With Full Front - about	4400	4900	5300	5800	7000	7700	8400	9000	10000	10200	11500	12000	13500	14500	16000	17000	19000	20000	24000	25000

POWER REQUIRED FOR A 10-STAMP DRY-CRUSHING SILVER MILL.

1 "Blake" rock-breaker, No. 2	= 6 horse power
2 Ore-feeders	= 0 horse power
10 Stamps, 750 lbs., 90 drops	= 12 horse power
1 "Howell White" furnace, 40 inches	= 4 horse power
4 Amalgamating pans, 5 feet diameter,	= 8 horse power
2 Settlers, 8 feet diameter	= 6 horse power
Friction	= 9 horse power
Total	= 45 horse power

POWER REQUIRED FOR A 10-STAMP WET-CRUSHING SILVER MILL.

1 "Blake" rock-breaker, No. 2	= 6 horse power
2 Ore-feeders	= 0 horse power
10 Stamps, 750 lbs., 90 drops	= 12 horse power
6 Grinding pans, 5 feet diameter	= 30 horse power
3 Settlers, 8 feet diameter	= 9 horse power
Friction	= 7 horse power
Total	= 64 horse power

The above power is capable of working 18 to 20 tons of ore per day of twenty-four hours.

The tendency in more modern stamp mills is to increase weight of stamp and number of drops increasing the capacity of the mills and the H. P. required proportion.

POWER REQUIRED FOR A 20-STAMP WET-CRUSHING SILVER MILL.

1 "Blake" rock-breaker, No. 2	=	6 horse power
4 Ore-feeders	=	0 horse power
20 Stamps, 750 lbs., 90 drops	=	23 horse power
12 Grinding pans, 5 feet diameter	=	60 horse power
6 Settlers, 8 feet diameter	=	18 horse power
Friction	=	13 horse power
Total	=	120 horse power

The above power is capable of working 40 tons of ore per day of twenty-four hours.

POWER REQUIRED FOR A 20-STAMP WET-CRUSHING GOLD MILL.

1 "Blake" rock-breaker, No. 2	=	6 horse power
4 Ore-feeders	=	0 horse power
20 Stamps, 750 lbs., 90 drops	=	23 horse power
8 Frue Vanner concentrators	=	4 horse power
1 Grinding pan, 8 feet diameter	=	3 horse power
1 Settler	=	3 horse power
Friction	=	7 horse power
Total	=	46 horse power

The above power is capable of working 35 to 40 tons of ore per day of twenty-four hours.

POWER REQUIRED FOR DIFFERENT PARTS OF GOLD AND SILVER MILLS.

Each 850-pound stamp, dropping 95 times per minute, requires 1.33 horse power.

Each 750-pound stamp, dropping 95 times per minute, requires 1.18 horse power.

Each 650-pound stamp, dropping 95 times per minute, requires 1 horse power.

Each 10 x 16-inch Blake rock breaker requires 15 horse power.

Each 8 x 12-inch Blake rock breaker requires 8 horse power.

Each Triumph concentrator, 220 revolutions per minute, requires ¾ horse power.

Each 48-inch clean-up pan, making 30 revolutions per minute, requires 1.5 horse power.

Each amalgam barrel, making 30 revolutions per minute, requires 2.5 horse power.

Each batea, at usual speed, requires 1 horse power.

Each 5-foot combination pan, making 65 revolutions per minute, requires 5 to 10 horse power.

Each 4-foot combination pan, making 65 revolutions per minute, requires 3 to 6 horse power.

Each 8-foot settler, making 14 revolutions per minute, requires 2.5 horse power.

Each 8-foot agitator, making 16 revolutions per minute, requires 3 horse power.

Each revolving dryer requires 3 horse power.

Each Howell-White roasting furnace requires 4 to 6 horse power.

Each Brückner furnace, 8 x 18 feet, requires 5 to 8 horse power.

Each set high-speed crushing rolls requires 10 to 50 horse power.

The above estimates include the friction of the parts named, but not that of the power transmitting machinery, for which an additional allowance should be made.

HORSE POWER FOR HOISTING.

The table gives the horse power required for hoisting various loads at the speeds shown. An allowance of 20 per cent has been made for friction.

Weight of Ore, Car, Cage, and Rope	SPEED—FEET PER MINUTE.										
	25	50	100	150	200	250	300	350	400	450	500
1000	⅞	1⅞	3¾	5½	7½	9	11	13	14½	16¼	18
1200	1	2¼	4¼	6½	8¾	11	13	15	17½	19½	22
1500	1½	2¾	5½	8¼	11	14	16½	17	22	24½	27¼
1800	1¾	3¼	6½	9¾	13	16¼	19½	22¾	26	29¼	32½
2000	1⅞	3¾	7½	11	14½	18	22	26	29	32½	36
2200	2	4	8	12	16	20	24	28	32	36	40
2500	2¼	4½	9	13½	18	22½	27	31½	36	40½	45
2800	2½	5	10	15	20	25	30	35	40	45	50
3000	2⅞	5¾	11½	17¼	23	28¾	34½	40¼	46	51¾	57½
3200	3	6	12	18	24	30	36	42	48	54	60
3500	3⅛	6¼	12½	18¾	25	31¼	37½	43¾	50	56¼	62½
3800	3½	7	14	21	28	35	42	49	56	63	70
4000	3¾	7¼	14½	21¾	29	36¼	43½	50¾	58	65¼	72½

INCLINED PLANE.

RULE.—Multiply the combined weights of ore, car, and rope by the depth and divide by the length of the incline. The result will be an equivalent weight raised vertically. For horse power see the table for hoisting.

EXAMPLE.—What horse power is necessary to hoist 4,000 pounds, at the rate of 300 feet per minute, up an incline 2,000 long and 250 feet deep.

$$\frac{4000 \times 250}{2000} = 500 \text{ lbs.}$$

In the hoisting table it will be found that to hoist 1,000 pounds 300 feet per minute requires 11 horse power, therefore 500 pounds will require 5½ horse power.

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